

FISCAL SUSTAINABILITY AND ITS IMPACT ON FINANCIAL STABILITY IN LITHUANIA AND OTHER NEW MEMBER STATES OF THE EUROPEAN UNION

Greta Keliuotytė-Staniulėnienė*

Vilnius University, Lithuania

Abstract. *Financial stability is related to both the real economic sector and public finance stability, and this cohesion is complex, ambiguous, especially complicated, includes many factors acting in different directions. Fiscal sustainability is one of the most significant factors of financial stability, and recently its significance has unfolded in the context of increasing fiscal imbalances and the government debt crisis. The growing interdependence between the public and the financial sectors leads to strengthening the two-direction connection between fiscal sustainability and financial stability. This article analyses one direction of this connection, i. e. implications of fiscal sustainability for financial stability. The complex research presented in this article involves the analysis of scientific literature, of statistical data, multi-criteria evaluation, the interstate comparative analysis, and panel estimation. The results of the research show that some fiscal variables may have a role to play in explaining changes of the financial stability index.*

Key words: *financial stability, fiscal sustainability, fiscal vulnerability*

Introduction

The global financial, economic and fiscal crisis of the recent years revealed complex interrelationships of financial, fiscal, political and economic instability, i.e. that the instability of one kind causes another one. Scientific literature analyzing the interaction of financial stability and fiscal sustainability recognizes that the cohesion of fiscal and financial stability is complex, ambiguous, and requires evaluation in each separate case – the above-mentioned spheres are related closely and perhaps interlaced integrally; however, there is no common understanding regarding the reasons of this coherence (due to the hardly predictable contagion, spill-overs, non-linear dependence of financial components and other factors). In scientific literature, it is agreed that connection between fiscal sustainability and financial stability is of two-directional nature – fiscal sustainability has some implications for a smooth and stable functioning of the financial

* *Corresponding author:*

Faculty of Economics, Department of Finance, Vilnius University, Sauletekio Ave. 9, LT-10222 Vilnius, Lithuania.
E-mail: g.keliuotyte@gmail.com

sector, and disturbances in the financial sector can have a significant influence on fiscal positions.

When observing the tendency of the increasing ratio of the government budget deficit to GDP during the last several decades in many countries and considering that the economic recession and slow economic recovery have induced the increase of fiscal imbalances in many countries even more, the issue of fiscal policy and the impact of fiscal sustainability on financial stability becomes especially relevant. However, there is no detailed analysis in the Lithuanian scientific literature how fiscal sustainability changes contribute to financial stability in the country, i.e. the relation of fiscal sustainability and financial stability is not defined unambiguously.

Depending on what is stated above, the **objective** of this article is to examine the interrelation of fiscal sustainability and financial stability in one of the directions – from fiscal policy towards financial stability, i. e. assess the changes of fiscal sustainability and its implications on financial stability in the case of Lithuania and some other new member states of the European Union (Latvia, Estonia, Czech Republic, and Slovakia). To achieve the objective, the following **methods** were applied: scientific literature analysis, statistical data analysis, interstate comparative analysis, multi-criteria evaluation, panel estimation.

1. Fiscal sustainability, financial stability, and their interaction

Statistical data show that the ratio of GDP and debts of economically developed countries increased during the period 2007–2012 on the average by 36% from GDP; in 2013, the ratio of GDP and debts of economically developed countries were still increasing (IMF, 2014), and this caused fiscal imbalances of various extent in many countries. On the one hand, these imbalances were determined by the direct factors through automatic response of taxes and state expenses to the deceleration of economics and, on the other hand, by the indirect factors through the usage of means of counter-cyclical discretionary fiscal policy. Thus, it can be recognized that this situation shows the fiscal policy of many countries to be not sustainable in the long-term perspective.

The concept of fiscal sustainability is basically associated with the fiscal policy (Burnside, 2004) or the dynamics of public debt (Cruz-Rodriguex, 2014). Assessment of fiscal sustainability is a largely dependent on how fiscal sustainability is defined. Generally speaking, there is distinction between three approaches to fiscal sustainability in scientific literature. According to the first approach (IMF, 2002; Croce et al., 2003), fiscal sustainability is related to solvency, i.e. the government's ability to service debts without default over an infinite time horizon. The second approach (Buiters, 1985) suggests that the sustainable fiscal policy ensures that the ratio of debt to GDP converges

back towards its initial level. Finally, the third approach (Alvarado, 2004) involves both criteria – solvency and the limitation of debt growth.

Gnan (2012) points out that the recent financial, economic and fiscal crisis has revealed the complexity of financial, fiscal, political and economic unstable interrelations. One type of instability leads to another. On the theoretical level, the topic of financial stability asserts in several spheres. On the one hand, there is no universally accepted definition of financial stability and no universal assessment indicator (system of indicators). On the other hand, the relation of financial stability with fiscal sustainability and political stability is complex and defined in scientific literature unambiguously. As Schinasi (2004) notes, regardless of the universally accepted significance, the analysis of financial stability (on both theoretical and practical levels) is still in the evolutionary stage as compared with monetary and (or) macroeconomic stability researches, and this determines the existence of the mentioned problems.

Authors analyzing the issues of financial stability definition submit the definitions of financial stability which differ in extent –from the most narrow view and up to the most extensive one. Financial stability may be defined as follows: emphasizing the absence of a situation opposite to financial stability, i.e. financial crisis (A. Houben et al., 2004; G. Schinasi, 2004), highlighting the influence of financial stability on macroeconomic processes (macroeconomic significance) (Financial system stability, 2005; ECB, 2007), according to the extensive concept of financial stability, assessing finance, money, real economic and state policy intercorrelation in the perspective of time (Houben et al., 2004; Schinasi, 2004). Schinasi (2004) broadly analyzes the definition of financial stability and highlights the following guidelines: first, financial stability is a broad concept covering different aspects of finance (infrastructure, institutions, and markets); second, financial stability shows that resources and risks are allocated and priced effectively and the payment system functions smoothly (financial stability and monetary stability overlap to a large extent); third, financial stability is related not only to the absence of financial crises, but also to the financial system's ability to avoid, encounter, and manage the fiscal imbalances that can potentially pose a threat to the financial system of economic processes (financial stability includes preventive and corrective dimensions); fourth, financial stability can be seen in the light of its consequences for the real economy (disturbances in the financial market or an individual financial institution are not considered as a threat to financial stability, if they have no significant impact on economic activity); fifth, financial stability must be understood as a continuum.

Authors analyzing assessment possibilities of financial stability (Hawkins et al., 2000; Nelson et al., 2005; Grey et al., 2007; Gersl et al., 2006; Haldane, 2004; Albuлесcu, 2008 and others) submit and analyze different indicators or their systems. An especially wide system of financial stability indicators and its usage methodology not only for the

purposes of assessing the financial system status of a particular country, but also for the purposes of interstate comparison is offered by the International Monetary Fund (Financial Soundness Indicators..., 2006). Some authors, for example, Haldane (2004), Albulescu (2008), Gersl et al. (2006) and others assess financial stability changes from the viewpoint of one aggregated index. Despite certain limitations, the aggregate index covering a set of financial indicators enables to evaluate the financial system as a whole. Moreover, it may be comparable at the international level.

In the recent years, the interaction of financial stability and fiscal sustainability has been analyzed by various authors. There are some empirical studies showing that financial crises are influenced by vulnerabilities related to changes of the public debt level and structure (Rosenberg et al., 2005; Guscina, 2008; de Bolle et al., 2006). For instance, Hoogduin et al. (2010) have showed that the increase of the short-term debt share causes a higher risk of refinancing and strengthens the relationship between public debt management, financial stability, and monetary policy. Cecchetti (2011) claims that fiscal policy can be considered as the main risk to financial and monetary stability. Moreover, Allen et al. (2002) point out that financial stability can be perceived as a function of vulnerabilities in different sectors of economy. Das et al. (2010) explore financial stability as a function of public debt (securities) level, portfolio (composition), investment base, development of the capital (debt) market and institutional factors.

A number of authors (for example, Honohan (2007); Jesic (2013)) agree that there exist pressures from fiscal policy (fiscal or public debt sustainability) to the financial system, i.e. an unsustainable fiscal stance can influence financial stability. The recent financial, economic and fiscal crisis has shown that fiscal sustainability problems can destabilize government bond markets and banking systems (Gnan, 2012). The negative attitude to sovereign risk, as well as the deteriorating credit ratings and the consequently constricting investor base increase debt issuance costs and limit the opportunities of public borrowing. This situation increases the pressure on financial institutions (because of government securities in their balances). Finally, the market pessimism narrows the investor's base, which can lead to a reduction of public debt liquidity. In addition, although the policy of public debt financing is important for the transmission of sovereign risk, it can become a source of financial instability when the debt-deficit spiral and refinancing problems negatively affect the sovereign risk and its contagion to the financial sector. The impact on financial stability depends mainly on the public debt level, maturity, and ownership structure (Hoogduin et al., 2010). Considering that the sovereign debt portfolio is usually the largest financial portfolio in the country and is characterized by difficult positions, it inevitably poses a certain risk to the financial sector. This risk especially increases when a relative share of debt denominated in foreign currency and a relative share of short-term debt are large (Wheeler, 2004).

As mentioned above, fiscal sustainability is closely related to the sovereign default risk and sovereign creditworthiness. Rises of sovereign risk negatively affect the banking system. The analysis of scientific literature (Caruana et al., 2012; Committee on the Global Financial System, 2011; Jesic et al., 2013; Komarkova et al., 2013; Janacek et al., 2012) enables to distinguish the following channels of sovereign risk transmission to the financial sector:

1. The exposure to government debt.
2. The correlation between the credit ratings of sovereign and financial institutions.
3. The usage of government securities as collateral in numerous financial transactions between central banks and financial institutions and among financial institutions in private markets.
4. The possibility of a government giving implicit and explicit guarantees which influence risk perception in the financial system.
5. The macroeconomic environment as a reliable indicator of the way in which the fiscal policy is conducted.
6. Atypical measures of the fiscal policy that have a direct effect on the financial balances of financial institutions.

As Coccozza et al. (2011) note, fiscal policy may be considered as the means not only of macroeconomic stabilization, but also of the solution of bank system problems and the preservation of financial stability. On the basis of what has been said, this article further aims to evaluate empirically the consequences that unsustainable fiscal positions have on financial stability.

2. Methods

In order to evaluate empirically the impact of fiscal sustainability on financial stability, the research composed of the following stages was performed:

1. The calculation of the financial stability aggregated and partial indexes as a well as dynamic and comparative analysis of their values in chosen countries.
2. The calculation of fiscal sustainability (vulnerability) indexes as well as a dynamic and comparative analysis of their values in chosen countries.
3. Panel estimation which aims to investigate which fiscal vulnerability indicators explain the evolution of the aggregated financial stability index during the period of 2004–2013.

The analyzed period is 2004–2013. The selection of the period is based on the economic, methodological and practical arguments. On the one hand, according to the selected methodology, the data should include both financial stability and instability (crisis) periods. On the other hand, the selection of a period is restricted by the availability of data. Besides the analysis of the situation in Lithuania, it was decided to perform

an international comparison of financial stability and the fiscal sustainability level, its dynamics and interdependence with reference to data of some other new member states of the European Union – Latvia, Estonia, Czech Republic, and Slovakia.

Financial stability assessment methodology. The aggregated index necessary to evaluate the financial stability level and its changes as well as to perform interstate comparisons is calculated according to the methodology proposed by Albulescu (2008; 2010). It is important to note that this methodology allows not only to assess the changes of financial stability in a country, but also to define which financial stability components have the biggest influence on financial stability during the analyzed period. According to the selected methodology, the indicators and their sources presented in Table 1 are used for calculations. Statistical data used for the calculations have been presented by the World Bank, the Organisation for Economic Co-operation and Development, the International Monetary Fund, the European Central Bank, the Eurostat, Cesifo and other institutions and organizations, and calculated by the author.

TABLE 1. Individual indicators used to calculate the index of financial stability, and their data sources

Individual indicator		Index
I _{d1}	Total credit / GDP	Financial development index (FDI)
I _{d2}	Interest spread	
I _{d3}	Market capitalization / GDP	
I _{d4}	Banking reform and interest liberalization	
I _{v1}	Inflation rate	Financial vulnerability index (FVI)
I _{v2}	Budget deficit / GDP	
I _{v3}	Non governmental credit / total credit	
I _{v4}	Loans as percentage of deposits	
I _{s1}	Nonperforming loans / total loans	Financial soundness index (FSI)
I _{s2}	Regulatory capital / risk-weighted assets	
I _{s3}	Own capital / Total assets	
I _{s4}	Liquidity ratio	
I _{s5}	Funding base stability ratio	
I _{s6}	Leverage ratio	
I _{s7}	Total solvency ratio	
I _{w1}	Economic climate index	World economic climate index (WECI)
I _{w2}	Economic climate index for the euro area	
I _{w3}	Global inflation	
I _{w4}	World economic growth	

Source: compiled by the author, based on Albulescu (2008) and analysis of statistical data sources.

Individual indicators are grouped into four partial indexes – the financial development index, the financial vulnerability index, the financial soundness index, and the world

economic climate index. Seeking for comparability and to ensure that the influence of indicators with bigger absolute values wouldn't be unreasonably high for an aggregated indicator, the values of indicators were normalized. This was done using the method of simple additive weighting, i.e. calculating the ratio between the existing and the marginal (minimum if the value is minimized, or maximum if the value is maximized) value of an indicator (Migilinskas, 2003). The values of indicators normalized in such a way vary in the interval [0; 1] where the normalized value 1 indicates the financial stability situation and is equal to the best fixed value of the appropriate indicator, and the value 0 shows an opposite situation. Equal significance was given to all indicators. The universal simple additive weighting method (SAW) was selected in this research, and the financial development index (FDI), the financial vulnerability index (FVI), the financial soundness index (FSI), the world economic climate index (WECI) are calculated according to formulas (1–4).

$$FDI = \frac{\sum_{j=1}^4 I_{dj}}{4} \quad (1)$$

$$FVI = \frac{\sum_{j=1}^4 I_{vj}}{4} \quad (2)$$

$$FSI = \frac{\sum_{j=1}^7 I_{sj}}{7} \quad (3)$$

$$WECI = \frac{\sum_{j=1}^4 I_{wj}}{4} \quad (4)$$

After calculating the partial indexes, the aggregated financial stability index (FI) is calculated according to Formula 5:

$$FI = \frac{4 FDI \times 4 FVI \times 7 FSI \times 4 WECI}{19} \quad (5)$$

Fiscal sustainability assessment methodology. The fiscal vulnerability index methodology offered by Baldacci et al. (2011) was selected in this stage of the research. It summarizes the selected fiscal indicators and shows the fiscal vulnerability degree as a deviation from “historical standards” definable as 10-year interstate averages. The simplicity is considered as the main advantage of this indicator; moreover, it allows to evaluate the fiscal situation of a country in respect of common tendencies of state groups (Baldacci et al., 2011).

The selected fiscal variables (Table 2) are divided into three groups: the key fiscal variables (in order to ascertain whether the state debt dynamics is compatible with fiscal solvency), long-term fiscal tendencies (in order to evaluate to what extent the long-term economic challenges related to the demographic situation affect the projected fiscal

variables and influence fiscal solvency) and the management of assets and liabilities (looking from the perspective of fiscal solvency, it is assessed whether the structure of government assets and liabilities increases or decreases the refinancing risk). Data used for calculations have been given by the Eurostat, the European Commission, the European Central Bank, the International Monetary Fund, also calculated by the author.

TABLE 2. Individual indicators used to calculate the index of fiscal vulnerability and their data sources

Individual indicator		Index
F _{p1}	Difference between interest rate assigned to government debt and GDP growth rate	Key fiscal variables (KFV)
F _{p2}	General government debt as the percentage of GDP	
F _{p3}	Cyclically adjusted primary balance as the percentage of GDP	
F _{a1}	Current gross financing need as the percentage of GDP	Asset and liability management (ALM)
F _{a2}	Short-time debt/total debt	
F _{a3}	Debt denominated in euros as the percentage of GDP	
F _{a4}	Debt denominated in other foreign currencies as the percentage of GDP	
F _{a5}	Weighted average maturity of the general government debt	
F _{a6}	Debt held by the non-residents / total debt	
F _{t1}	Long-time projections of the change in public pension expenditure as the percentage of GDP	Long-term fiscal tendencies (LFT)
F _{t2}	Total fertility rate	
F _{t3}	Old age dependency ratio projections	
F _{t4}	Long-time projections of the change in public health expenditure as the percentage of GDP	

Source: compiled by the author, based on Baldacci et al. (2011) and the analysis of statistical data sources.

Calculating the fiscal vulnerability index, each indicator is transformed into the standardized z value¹. The unweighted mean of z values is calculated for each of the groups of fiscal indicators. It is necessary to emphasize that the unweighted mean method in this case is handy because it allows to calculate the indexes even if some of the necessary values are absent, i.e. in cases of the lack of data the result is not distorted. Calculating the index of each group (key fiscal variables – KFV, asset and liability management – ALM, long-term fiscal tendencies – LFT), z values are transformed into a cumulative normal distribution at an interval from 0 to 1, with the average equal to 0.5. The close to 1 index values show a high vulnerability level and those close to 0.5 are interpreted as showing a “normal” fiscal vulnerability degree. The aggregate fiscal vulnerability index (FVI) is calculated as the arithmetical mean of group index values.

¹ $z_t^i = \frac{x_t^i - \mu}{\sigma}$, where: μ – the 10-year x_t^i average calculated for country groups; x_t^i – i -th indicator value for t years; σ – standard deviation.

Panel estimation methodology. In order to econometrically establish the relationship of fiscal vulnerability indicators and the financial stability index dynamics, panel estimation is used. The sample is a panel consisting of 5 new member states of the European Union over the period from 2004 to 2013, with the financial stability index as a dependent variable and 12 regressors – the difference between interest rate assigned to the government debt and the GDP growth rate, the general government debt as a percentage of the GDP, the current gross financing need as a percentage of the GDP, a short-time debt / the total debt, the debt denominated in euros as a percentage of GDP, the debt denominated in other foreign currencies as the percentage of GDP, the weighted average maturity of the general government debt, debt held by non-residents / total debt, long-time projections of the change in public pension expenditure as the percentage of GDP, the total fertility rate, old age dependency ratio projections, long-time projections of the change in public health expenditure as the percentage of GDP. This is 50 pool balanced observations. The panel is estimated with both fixed and random effects.

3. Dynamics of the financial stability index

The analysis of financial stability changes in Lithuania has been performed according to the calculated partial financial development, financial vulnerability, financial soundness, and world economic climate indexes, and the aggregated financial stability index. Changes of the aggregated financial stability index and partial indexes in Lithuania during 2004–2013 are seen in Fig. 1.

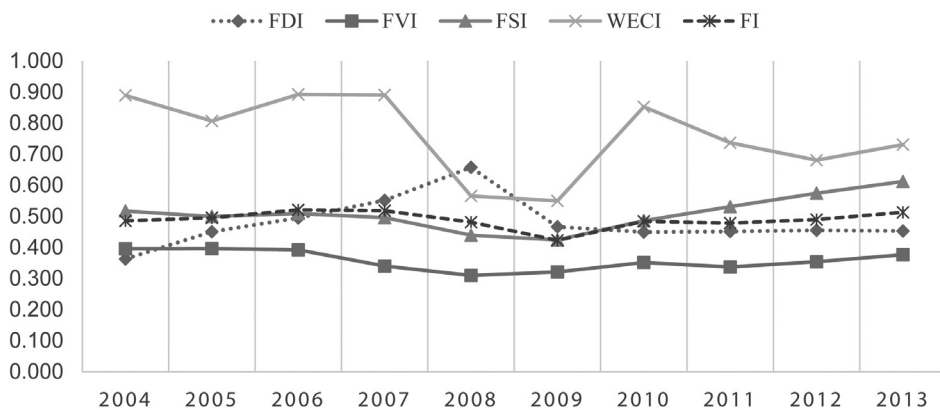


FIG. 1. Dynamics of FI, FDI, FVI, FSI and WECl in Lithuania, 2004–2013

Source: compiled by the author, based on the author's calculations.

As one can see in Fig. 1, the Lithuanian financial stability index significantly decreased in 2009, and it reflects the impact of the global financial crisis. However, the tendency of the index decrease was observed already from 2006. The value of the financial stability index obviously grew up in 2010 and was consistently increasing until 2013, reaching the pre-crisis level. The decrease of the values of the financial stability index was determined significantly by the decreasing world economic climate index, also strengthened by the deceleration of financial development and the decreasing financial reliability of the country.

Analyzing changes of the financial stability index components, it may be noted that the financial development index increased significantly during 2004–2009; however, it reached the lowest value in 2009 and increased marginally during 2009–2013. It should be noted that positive changes of the financial development in Lithuania are associated with the growth of the financial mediation level in the country (the growth of the extent of credits provided by the financial sector) and especially the rapidly decreasing difference of credits and deposit interest rates (spread). On the other hand, it is the increase in the difference of credit and deposit interest rates that quite dramatically reflected the instability period in Lithuania and, together with the decrease of market capitalization (slow capital market development) largely determined negative changes of the financial development in the country during the after-crisis period.

The values of the financial vulnerability index reflecting the possibility of financial stability vulnerabilities arising from the financial, state or business sector, were distinguished by the least variation; however, a decrease is also observed in 2008 due to an increased inflation level (increasing macroeconomic vulnerability) and especially the large ratio of credits and deposits (increasing imbalance in the financial system). The budget deficit growth also increased the financial vulnerability in the country, i.e. a decrease of fiscal sustainability. From 2010, financial vulnerability in Lithuania started to decrease due to a significantly decreased ratio of credits and deposits as well as the decreasing level of inflation.

The financial soundness index, which acquired the lowest value in 2009, increased significantly in later years. The decrease of financial soundness in Lithuania was determined by the declining quality of the credit portfolio (growth of non-performing credit share in the whole credit portfolio) and a decrease of the funding base stability, while the increasing banking sector capitalization (the ratio of the own capital and the whole assets) as well as the overall solvency ratio made the biggest influence on the increase of financial soundness during the after-crisis period. Figure 2 also shows that the world economic climate index drastically decreased during 2008–2009 (what was determined by negative tendencies of all individual indicators included in this index, especially the world inflation and the world economic growth rate) and until 2013 has

not reached the pre-crisis level, what was largely determined by the slow world economic growth. The summing up of this research stage and a comparison with other countries are presented in Table 3.

TABLE 3. The main factors of financial stability index dynamics

	FDI	FVI	FSI
Lithuania	Financial mediation level Interest spread Market capitalization	Inflation rate Loans-credit ratio Budget deficit	Capitalization of the banking sector Quality of the credit portfolio Funding base stability Solvency
Latvia	Financial mediation level Interest spread Market capitalization	Inflation rate Loans-credit ratio Budget deficit	Capitalization of the banking sector Quality of the credit portfolio Funding base stability Liquidity
Estonia	Financial mediation level Interest spread Market capitalization	Inflation rate Budget deficit	Capitalization of the banking sector Funding base stability Solvency Liquidity
Czech Republic	Interest spread Market capitalization	Inflation rate	Capitalization of the banking sector Funding base stability Solvency Liquidity
Slovakia	Interest spread Market capitalization	Loans-credit ratio	Capitalization of the banking sector Quality of the credit portfolio Solvency Liquidity

Source: compiled by the author, based on the author's calculations.

Thus, the dynamics of the calculated financial stability index in the analyzed countries reflects the impact of the financial crisis, and the analysis of the dynamics of partial indexes allows highlighting the main reasons for the financial stability level dynamics in separate countries. The results of the analysis of dynamics of the financial stability index allow summarily to state that financial vulnerability and financial security are the main summarized factors that determined changes of the financial stability index in Lithuania, Latvia, Estonia, Czech Republic and Slovakia during the period of 2004–2013. Capital market capitalization and interest spread are considered as the basic factors that determined changes of the financial development index. Inflation level and budget deficit are considered as the main factors that determined changes in the values of the financial vulnerability index, and the bank sector capitalization and the quality of credit portfolio can be considered the main factors that determined changes of the financial soundness index values. Moreover, comparative changes of the financial stability level during the analyzed period are determined by the variation of the financial vulnerability index what was largely influenced by the fiscal indicator – the ratio of budget deficit

to GDP. This allows to state reasonably that fiscal sustainability is an important factor of financial stability. For this reason, it is expedient to evaluate the influence of fiscal indicators on financial stability changes.

4. Dynamics of the fiscal vulnerability index

After analyzing the financial stability index dynamics in Lithuania, it is necessary to shift to the analysis of one of the financial stability factors – fiscal sustainability. The dynamics of the fiscal vulnerability index (FVI) and partial indexes (KFV, ALM, LFT) in Lithuania are shown in Fig. 2.

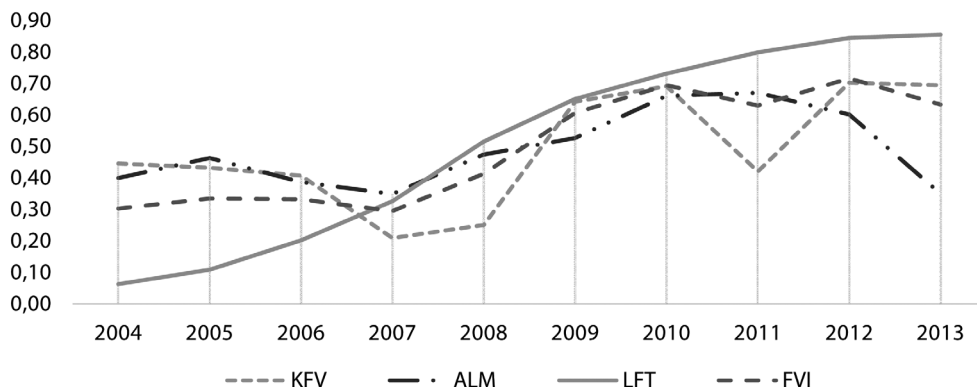


FIG. 2. Dynamics of FVI, KFV, ALM, LFT indexes in Lithuania, 2004–2013

Source: compiled by the author, based on the author's calculations.

As one can see from Fig. 2, during the study period, the value of the fiscal vulnerability index in Lithuania has increased, and only in 2007 and 2011 a decrease of fiscal vulnerability was observed. It should be noted that the fiscal vulnerability index in Lithuania during 2004–2007 was rather lower than the historical average of the selected countries; in 2008 it reached the value close to the average and from 2009 exceeded the historical average, what shows an increase of fiscal vulnerability. From 2008, the partial KFV and LFT indexes assumed an increasing tendency, while the ALM index which had grown since 2008 decreased significantly during 2012–2013. The biggest pressure for the fiscal sustainability in Lithuania during this period was made by the increasing index of long-term fiscal tendencies.

The KFV index, reflecting the influence of the main fiscal variables on the fiscal vulnerability level, significantly decreased in 2007 (due to the improving interest rate-growth differential) (showing the growth of fiscal solvency and the decreasing level of debt) and in 2011 (for the same reasons), and the biggest growth was observed in 2009 (determined by the especially declined interest rate-growth differential, i.e. the

especially decreased fiscal solvency, and the increasing level of state debt) and in 2012 (determined by the same reasons); therefore, the value of the index noticeably exceeds the historical group average. The ALM index, largely reflecting the influence of public debt management on fiscal sustainability, marginally decreased in 2007 (a decrease of the refinancing risk (decreasing part of the debt in currency other than euro) and a decreasing international market risk (part of the debt for non-residents)), significantly grew until 2011 and assumed a dramatic decreasing tendency in later years. During 2008–2011, the observed growth of the index (its historical average was exceeded in 2009) was largely determined by the growing rate of currency and the international market risk (the growth of a comparative part of debt in foreign currency and of debt for non-residents), and the decreasing tendency that emerged in later years was determined by the negative market reaction (decreased current funding need), currency (decreased share of the debt in foreign currency), and the international market (decreased share of the debt for non-residents) risks. Thus, recently positive changes emerged in the structure of state debt (in 2013, the ALM index value decreased below its historical average). The constant growth of the LFT index in Lithuania, observed during the analyzed period (values of its historical average were exceeded in 2009), signalizes about the increasing pressure of long-term fiscal tendencies on fiscal sustainability and in fact is determined by the increasing pressure of the future planned expenditures on pensions and health protection.

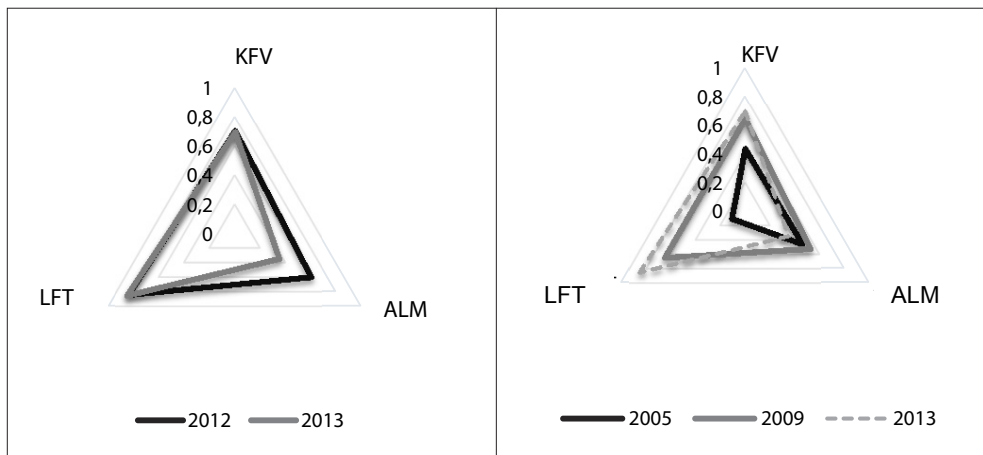


FIG. 3. Dynamics of FVI, KfV, ALM, LFT indexes in Lithuania, 2012–2013 (left) and 2005–2009–2013 (right)
 Source: compiled by the author, based on the author's calculations.

Figure 3 reflects changes of the partial fiscal vulnerability indexes in Lithuania during 2012–2013 (on the left) and 2005–2009–2013 (on the right). When assessing fiscal sustainability changes during 2012–2013, it is obvious that the overall improvement of the fiscal sustainability situation in Lithuania is related to significant changes in the sphere

of managing the government debt, in other words, related to positive changes of the state debt structure. Assessing the fiscal sustainability changes during 2005–2009–2013, it is possible to note that, as compared with 2005, the KfV and LFT values especially increased during the crisis (due to the decrease of fiscal solvency, growing debt and the increasing pressure of forecasted expenditure for pensions and health protection), what determined the increase of the overall fiscal vulnerability level. Comparing the crisis period with 2013, it becomes obvious that even the government debt structure has

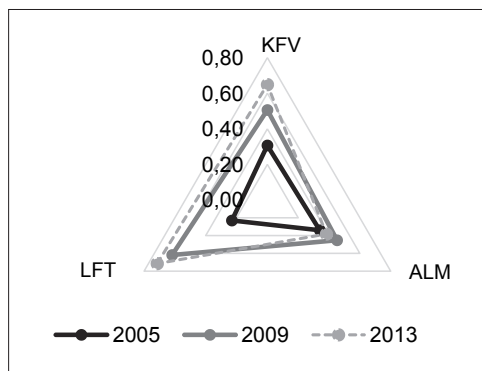


FIG. 4. Dynamics of FVI, KfV, ALM, LFT indexes in Baltic countries, 2005–2013

Source: compiled by the author, based on the author's calculations.

while the KfV and the LFT index values exceeded it – the interval of index values was 0.45–0.62. During this period, the debt structure is not considered as a source of fiscal vulnerability of the Baltic States; however, the negative influence of the key fiscal variables and the pressure of long-term fiscal tendencies increased significantly, what determined that the fiscal vulnerability index increased from 0.33 (in 2005) to 0.62 (in 2009). In 2013, an increase of the ALM value was observed (positive changes of the government debt structure) and a decrease of the LFT and KfV values (the negative influence of main fiscal variables on fiscal sustainability and the pressure of long-term fiscal tendencies on public finances increase). However, due to the positive influence of the government debt structure, the fiscal vulnerability index decreased to 0.58 in 2013. Summarized results of the analysis of fiscal sustainability dynamics in Lithuania and other countries during the period of 2004–2013 are presented in Table 4.

In summary, it is possible to say that the results of this research stage have shown that fiscal vulnerability in the selected group of countries during the analyzed period increased significantly, especially due to the negative influence of the key fiscal variables and increasing pressure of long-term fiscal tendencies on the government budget and fiscal sustainability. Moreover, it has been revealed that fiscal sustainability in a different countries is affected by different combination of fiscal factors; however, all the selected

changed in the positive direction, the main fiscal variables decline, and the pressure of long-term fiscal tendencies on fiscal sustainability especially grows.

Figure 4 shows how values of partial indexes, calculated for the Baltic countries, varied during the period of 2005–2013. As seen, in 2005 the KfV, ALM and LFT index values were below the normal limit and varied in the interval 0.23–0.34, therefore the overall fiscal vulnerability level was low (in respect of fiscal sustainability it is assessed positively). In 2009 the KfV index value reached the normal limit,

countries encountered specific problems of fiscal sustainability – the biggest challenges for the countries were the growth of the government debt level, the interest rate-growth differential, the risky state debt structure, and an increase of the forecasted budget expenses related to the ageing of population.

TABLE 4. The main factors of fiscal vulnerability index dynamics

	The main factors of index dynamics				Current situation and future challenges
	FVI	KFV	ALM	LFT	
Lithuania	LFT	Interest rate-growth differential, government debt level	Debt in foreign currency, debt for non-residents	Expenditure on pensions, health	Pressure of long-term fiscal tendencies, positive changes in debt structure, stabilization of key fiscal variables
Latvia	ALM	Interest rate-growth differential, government debt level	Short-time debt, debt for non-residents	Old age dependency ratio	Deteriorating debt structure, however, small pressure of long-term fiscal tendencies and improving key fiscal variables
Estonia	LFT, ALM	Government debt level, cyclically adjusted primary balance	Short-time debt	Old age dependency ratio, expenditure on health	Moderate pressure of long-term fiscal tendencies, increasing negative impact of key fiscal variables, positive changes in debt structure
Czech Republic	KFV, ALM, LFT	Interest rate-growth differential, government debt level	Financing need, debt in foreign currency, debt for non-residents	Old age dependency ratio, expenditure on pensions, health	Deteriorating debt structure, significant pressure of long-term fiscal tendencies, negative impact of key fiscal variables
Slovakia	KFV, ALM	Interest rate-growth differential, government debt level	Short-time debt, debt in foreign currency	Old age dependency ratio, expenditure on pensions, health	Negative impact of key fiscal variables, deteriorating debt structure, pressure of long-term fiscal tendencies

Source: compiled by the author, based on the author's calculations.

5. Relationship between fiscal indicators and the financial stability index – panel estimation

The aim of this stage of the research is to ascertain whether fiscal variables can help to explain changes of the financial stability index. The panel was estimated with fixed effects and with random effects. As the Hausman test statistics in our case indicates that a random effects model would not lead to different results, only results of panel estimation with fixed effects are presented in Table 5. As one can see, 7 from 12 indicators of fiscal vulnerability are significantly related to changes of the financial stability index.

TABLE 5. Results of panel estimation with FI as a dependent variable

Variable	Coefficient value	t-statistic	Probability
Current financing need / GDP	-0.026612	-9.052	0.0000
Projected health expenditure / GDP	-0.020045	-2.984	0.0134
Average maturity of debt	0.014890	8.165	0.0000
Old age ratio	-0.003893	-6.173	0.0000
Debt denominated in foreign currency / total debt	-0.002631	-4.666	0.0000
Short-time debt / total debt	-0.001414	-4.754	0.0000
Debt denominated in euro / total debt	0.000830	5.877	0.0000

Source: compiled by the author, based on the author's calculations.

As is apparent from Table 5, fiscal variables exerting the greatest pressure on the financial stability are current gross financing need as the percentage of GDP and long-time projections of the change in public health expenditure as the percentage of GDP: the rising financing need and the projected government spending on health care lead to a decreased financial stability index. Meanwhile, improving the maturity structure of the public debt stock is associated with a decreased pressure on the financial stability index. Old age ratio, the share of debt denominated in foreign currency, and the share of short-time debt put a downward pressure on the financial stability index; however, this pressure seems to be significantly lower than in the case of financing need and government expenditure on health. Finally, the results of panel estimation show a positive relationship between the share of debt denominated in euro and the financial stability index. Hence, it can be stated that some of the fiscal variables are correlated with the financial stability index. As a result, these fiscal variables may have a role to play in explaining changes of the financial stability index, although the impact in some cases may be indirect.

Conclusions

Financial vulnerability and financial security are the main summarized factors that determined changes of the financial stability index in Lithuania, Latvia, Estonia, Czech Republic, and Slovakia during 2004–2013. The main factors of the financial development index changes are capital market capitalization and interest spread, the financial vulnerability index – inflation level and budget deficit, the financial soundness index – the banking sector capitalization and the quality of the credit portfolio.

Comparative changes of the financial stability level during the analyzed period are determined by the variation of the financial vulnerability index, what was largely influenced by a fiscal indicator – the ratio of budget deficit and GDP. This allows to state reasonably that fiscal sustainability is an important factor of financial stability.

The value of the fiscal vulnerability index in Lithuania has increased during the analyzed period and in 2004–2007 was rather less than the historical average of the selected countries; in 2008 it reached the value close to average and from 2009 exceeded the historical average, what shows an increase of fiscal vulnerability. The biggest pressure on fiscal sustainability in Lithuania during this period was made by the increasing long-term fiscal tendencies index.

The panel estimation shows that the current gross financing need and long-time projections of the change in public health expenditure are fiscal vulnerability variables which exert the biggest negative pressure on the financial stability index over the period from 2004 to 2013. These and some other fiscal variables (the average debt maturity, old age ratio, the share of debt denominated in foreign currency, and the share of short-time debt, of debt denominated in euro) are correlated with the financial stability index and can partially explain changes of the financial stability index, although the impact in some cases may be indirect.

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